Q1. This question is about the nervous system.

(a) Describe the function of receptors in the skin.

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(2)

(b) A response is caused when information in the nervous system reaches an effector.

(i) There are two different types of effector.

Complete the table to show:

- the two different types of effector
- the response each type of effector makes.

Type of effector	Response the effector makes
1	....
2	....

(4)

(ii) Some effectors help to control body temperature.

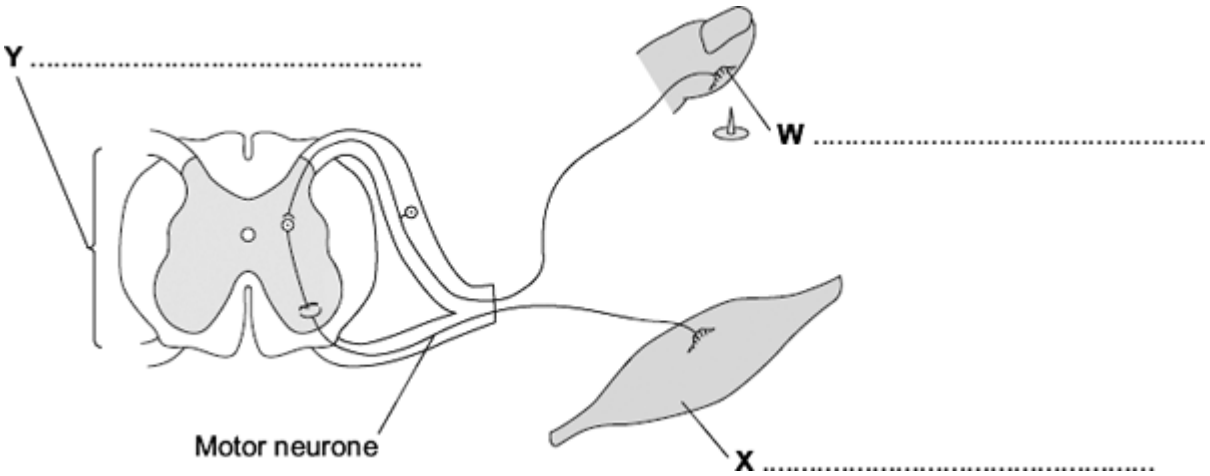
Give **one** reason why it is important to control body temperature.

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(1)
(Total 7 marks)

Q2. The diagram shows the structures involved in a reflex action.



(a) On the diagram, name the structures labelled **W**, **X** and **Y**.

(3)

(b) The control of blood sugar level is an example of an action controlled by hormones.

Give **two** ways in which a reflex action is different from an action controlled by hormones.

1 .....

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2 .....

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(2)
(Total 5 marks)

Q3. Diabetes is a disease in which a person's blood glucose concentration may rise.

Doctors give people drugs to treat diabetes.

The table shows some of the side effects on the body of four drugs, **A, B, C** and **insulin,** used to treat diabetes.

Drug	Side effects on the body
A	Weight loss Liver, kidney and heart damage Feeling of sickness
B	Weight gain Damage to some cells in pancreas
C	More water is kept in the body Weight gain ncreased chance of bone breakage in women
Insulin	A little more water is kept in the body Weight gain ncreased risk of lung damage

(a) Which drug, **A, B, C** or **insulin,** is most likely to result in an increase in blood sugar concentration in some people?

Explain your answer.

Drug .....

Explanation

.....

.....

(2)

(b) (i) Drugs **A, B and C** can be taken as tablets.

The chemicals in the tablets are absorbed into the blood from the digestive system.

Insulin is a protein.

Insulin **cannot** be taken as a tablet.

Why?

.....

(1)

(ii) Other than using drugs, give **two** methods of treating diabetes.

1 .....

2 .....

(2)

(Total 5 marks)

Q4. The human body produces many hormones.

(a) (i) What is a *hormone*?

.....

.....

(1)

(ii) Name an organ that produces a hormone.

.....

(1)

(iii) How are hormones transported to their target organs?

.....

(1)

(b) Describe how the hormones FSH, oestrogen and LH are involved in the control of the menstrual cycle.

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(3)

(Total 6 marks)

Q5. A group of students is going on an outdoor expedition.
The students need to keep warm in windy conditions.

The table shows the effect of wind speed on how quickly someone gets frostbite at different air temperatures.

Wind speed in metres per second	Air temperature in °C				
	10	**0**	**–10**	**–20**	**–30**
0					
5					
10					
15					
20					

Key

Time taken to get frostbite:

- No frostbite
- 30 minutes
- 10 minutes
- 5 minutes

(a) (i) Describe the effect of changing air temperature on the time taken to get frostbite.

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(1)

(ii) What is the longest time it is safe to stay outside when the air temperature is –20 °C and the wind speed is 10 metres per second?

..... minutes

(1)

(b) When core body temperature begins to fall, changes may happen in the body.

Which **two** changes will happen when core body temperature begins to fall?

Tick (✓) **two** boxes.

More blood flows through skin capillaries ☐

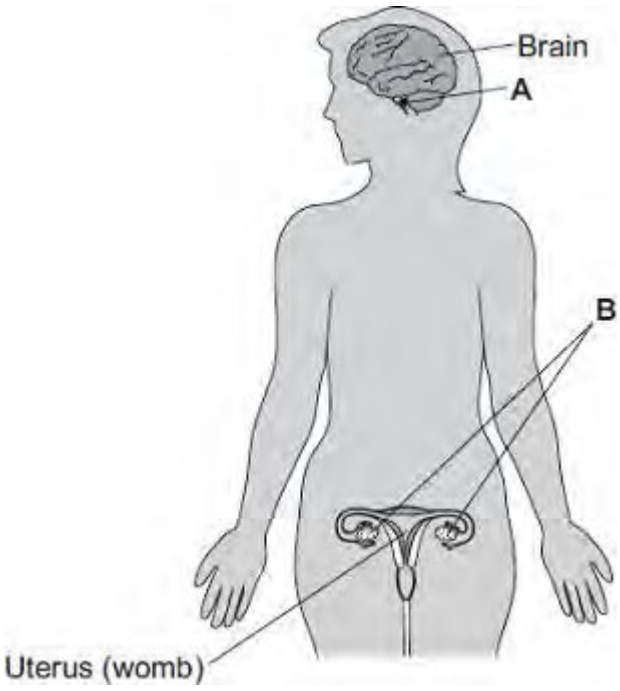
Muscles 'shiver' ☐

Blood vessels supplying the skin capillaries constrict ☐

Sweat glands release more sweat ☐

(2)
(Total 4 marks)

Q6. The diagram shows the position of two glands, **A** and **B**, in a woman.



(a) (i) Name glands **A** and **B**.

A .....

B .....

(2)

(ii) Gland **A** produces the hormone Follicle Stimulating Hormone (FSH).

FSH controls changes in gland **B**.

How does FSH move from gland **A** to gland **B**?

.....

(1)

(b) (i) A woman is not able to become pregnant. The woman does not produce mature eggs. The woman decides to have In Vitro Fertilisation (IVF) treatment.

Which **two** hormones will help the woman produce and release mature eggs?

Tick (✓) **one** box.

FSH and Luteinising Hormone (LH) ☐

FSH and oestrogen ☐

Luteinising Hormone (LH) and oestrogen ☐

(1)

(ii) Giving these hormones to the woman helps her to produce several mature eggs.
Doctors collect the mature eggs from the woman in an operation.

Describe how the mature eggs are used in IVF treatment so that the woman may become pregnant.

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(3)

(iii) IVF clinics have been set a target to reduce multiple births.

At least 76% of IVF treatments should result in single babies and a maximum of 24% of treatments should result in multiple births.

Suggest **one** reason why the clinics have been set this target to reduce multiple births.

.....

.....

(1)

(c) Two clinics, **R** and **S**, used IVF treatment on women in 2007. Doctors at each clinic used the results of the treatments to predict the success rate of treatments in 2008.

The table shows the information.

	Total number of IVF treatments in 2007	**Number of IVF treatments resulting in pregnancy in 2007**	**Predicted percentage success rate in 2008**
Clinic **R**	1004	200	18–23
Clinic **S**	98	20	3–56

(i) Compare the success rates of the two clinics in 2007.

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(1)

(ii) The range of the predicted success rate in 2008 for clinic **R** is much smaller than the range of the predicted success rate for clinic **S**.

Suggest why.

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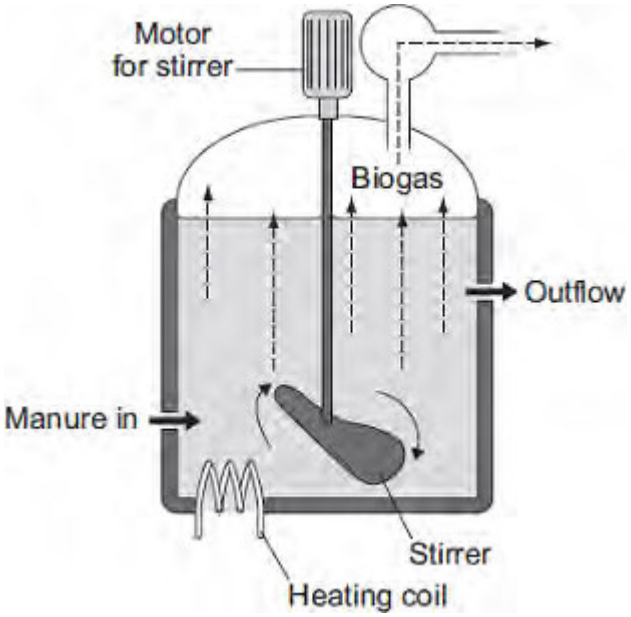
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(2)
(Total 11 marks)

Q7. The diagram shows one type of *anaerobic* digester. The digester is used to produce biogas.



(a) (i) What does *anaerobic* mean?

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(1)

(ii) The concentration of solids that are fed into this digester must be kept very low.

Suggest **one** reason why.

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(1)

(iii) This digester is more expensive to run than some other simpler designs of biogas generator.

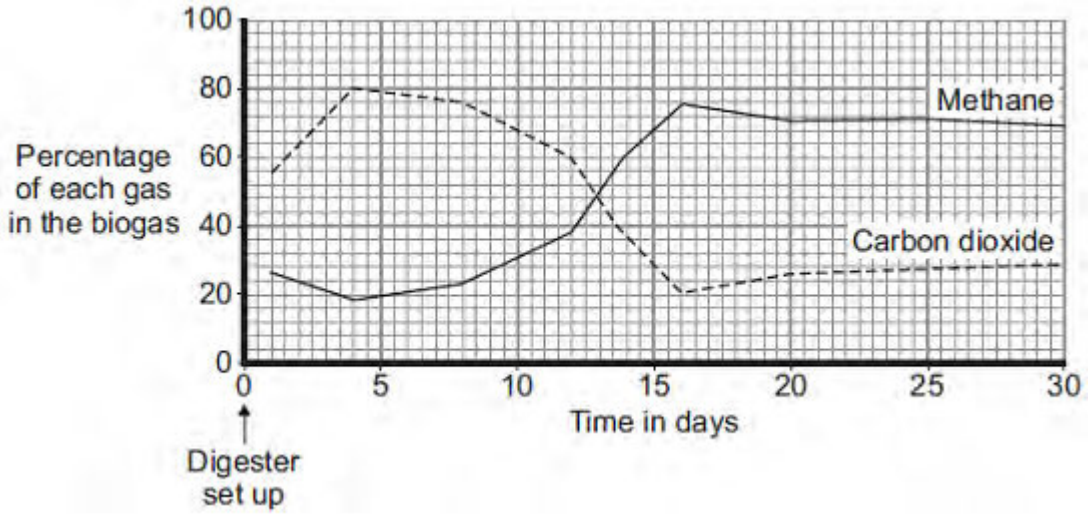
Suggest **one** reason why.

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(1)

(b) The graph shows how the composition of the biogas produced by the digester changed over the first 30 days after the digester was set up.



Use information from the graph to answer the following questions.

(i) Describe how the percentage of carbon dioxide changed over the 30 days.

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(3)

(ii) On which day was the best quality biogas produced? .....

(1)

(c) Four days after the digester was first set up, the biogas contained a high percentage of carbon dioxide.

Suggest an explanation for this.

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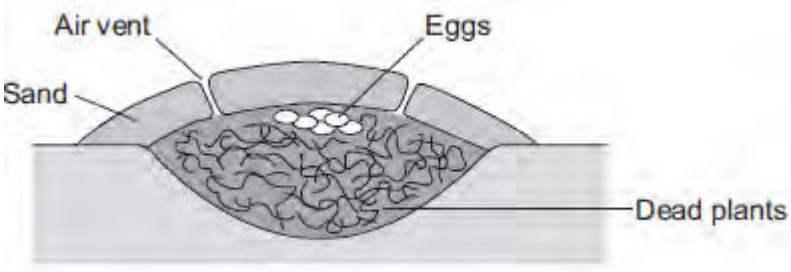
(2)
(Total 9 marks)

Q8. Most birds sit on their eggs to keep them warm until they hatch.

Megapode birds:

- dig a large hole in sand
- fill the hole with dead plants
- lay their eggs on top of the dead plants
- cover the surface with a thick layer of sand.

The image below shows a megapode bird's nest.



(a) The dead plants in the nest decay. The decaying process helps to keep the eggs warm for many weeks.

Suggest how.

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(3)

(b) (i) Megapode birds open and close the air vents of the nest at different times of

the day.

Suggest reasons why it is necessary to open and close the air vents.

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(3)

(ii) The sex of a megapode bird that hatches from an egg depends on the temperature at which the egg was kept.

Use this information to suggest why it is important for megapode birds to control the temperature of their nests.

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(1)
(Total 7 marks)

Q9.In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.

The human body is kept at a constant internal temperature of about 37 °C.

Body temperature is monitored and controlled by the thermoregulatory centre in the brain.

Describe what happens in the body to keep the body temperature constant.

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Extra space .....

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(Total 6 marks)